OBITUARY NOTICES

PROFESSOR **FRANCIS GIBSON BAILY, M.A.,** who was born on the 18th March, 1868, died on the 23rd February, 1945, in his 77th year, at Juniper Green, Midlothian. He was educated at University College School, London, at the School of Mines at Clausthal, Germany, and at St. John's College, Cambridge, where he obtained a First Class in the Natural Science Tripos in 1888–89. From 1889 to 1892 he obtained practical experience with James Simpson and Co., and with Siemens Bros. He then went as a lecturer to University College, Liverpool, where he had the late Prof. W. M. Thornton as a student. In 1896 he was appointed Professor of Electrical Engineering at Heriot-Watt College, Edinburgh, where he remained for 37 years, retiring in 1933.

He was President of the Engineering Section of the British Association at the Aberdeen meeting in 1934. In his Presidential Address he dealt with the cheaper generation of power, both by a more economical use of coal and by the development of water power, with special reference to Scotland. He had always been keenly interested in this subject, and had read a paper on "The Distribution of Energy in Towns" before the Liverpool Engineering Society in 1895. In later years he frequently wrote and spoke on the development of water power, stressing always the preservation of natural beauty. During the War of 1914–18 he worked on the development of a sensitive microphone with which to detect tunnelling in trench warfare. It was probably this that led him later to develop a sensitive bifilar seismograph. This was erected in a small hut in his garden and is said to have responded to a cat walking across the lawn.

He was best known to scientists for his magnetic researches. In 1894 he read before Section A of the British Association his celebrated paper on the hysteresis of iron and steel in a rotating magnetic field, showing that beyond a certain value of flux density the loss decreased with increasing saturation. In the following year he read a paper, also before Section A, showing that in an alternating magnetic field the hysteresis loss does not increase so rapidly at very high saturation. In 1901 he described in *The Electrician* a novel form of permeameter and contributed several articles on various magnetic subjects. In 1914 the Edinburgh Royal Society of Arts, of which he was a Fellow, awarded him the Hepburn Prize for a paper on "A New Form of Milk Steriliser adapted for Domestic Use." He was very active to the end: *The Architectural Review* for April, 1945, contained a paper on "Small Water Power Schemes," which he wrote a few weeks before his death.

In 1899 he married Margaret Naismith Osborne Pagan who survives him. They had one son and one daughter.

He joined The Institution as an Associate in 1889 and was elected a Member in 1900. He served as Chairman of the Glasgow Local Section in 1907 and again in 1934 when it had become the Scottish Centre. His first Chairman's Address was devoted to the subject of "Apprenticeship and Education"; in his second, he reviewed the developments which had taken place during his 45 years' association with The Institution. G. W. O. H.

JOHN RUTHERFORD BLAIKIE, a native of Staffordshire, was born in 1871 and died on the 21st July, 1945. He received his engineering education at Finsbury Technical College, and his practical training with the City of Bath Electric Lighting and Engineering Co. and the Taunton Electric Lighting Co. In 1892 he was appointed 3rd Assistant Engineer at the Bristol Corporation Electricity Works, becoming Chief Assistant in 1894, and in 1898 he was appointed Chief Electrical Engineer to the Vestry of St. Mary Newington (Southwark). He resigned this appointment in 1904 to take up research work, but subsequently joined the staff of Kincaid, Waller and Manville, for whom he superintended the installation of electric tramways at Hastings. Later he went to Brazil for the same firm, who were carrying out a similar contract at Porto Alegre. He then joined his brother in British Columbia, returning to this country in 1915, when he was appointed to the staff of the Bedford Electricity Undertaking. Subsequently he took charge of constructional work in connection with the extension of the generating station, and, except for a short interval, he remained with the Bedford Undertaking until 1936, when he retired.

He was a man of wide interests, and his contemporaries will remember many instances of both technical and social interest in which he played a leading part. His early experience in the pioneer days of the electricity supply industry developed a naturally inventive ability which showed itself in an originality of method applied to proposals for the solution of current problems. His contribution to the debates on tariffs was an example of this ingenuity, and, in another sphere, he was largely responsible for one of the earliest schemes for the conveyance of boiler-house ashes by hydraulic means. His interests in the fine arts was well known to his friends.

He married while in Victoria, British Columbia, and is survived by his widow, one son and two daughters. During the early years of the war he was actively engaged in A.R.P. duties where enemy action was severe, and it is probable that his death was accelerated by overstrain.

He joined The Institution as a Student in 1890 and was elected an Associate in 1893, an Associate Member in 1899 and a Member in 1913. His paper on "Electric Supply Conditions and Hopkinson Principles" appeared in the *Journal* in 1921. H. B. J.

ROBERT PERCY BROUSSON, O.B.E., who died on the 1st July, 1945, at the age of 74, received his technical education at Finsbury Technical College, and his practical training with Woodhouse and Rawson, with whom he remained for ten years after completing his training. He then spent two years as a lecturer at Finsbury Technical College, and, from 1897 to 1901, after a short period with the Westinghouse Electric Co. at Pittsburgh, he supervised the construction of the Central London Railway. From 1901 to 1904 he was engaged in a similar capacity by the contractors to the Great Northern and City Railway, and was then retained by the railway company as Engineer and Traffic Manager.

In 1913 he joined the staff of the Anglo-Mexican Petroleum Co., and the following year he was appointed to an important position under Sir Ernest Pearson in connection with the munitions factory at Gretna Green, for his services at which he was made an O.B.E. From this appointment he returned to the Anglo-Mexican Petroleum Co., and subsequently became a director of the Eagle Oil and Shipping Co., and of its numerous subsidiary and associated companies. He retired at the end of 1944, following a long illness. His kindly disposition and the sympathetic interest he took in those members of his staffs with whom he came into contact—and these were many, both overseas and in this country—endeared him to all.

He joined The Institution as a Student in 1890 and was elected an Associate in 1893, an Associate Member in 1899 and a Member in 1905.

ROBERT HENRY BRYANS, after a long illness, died at Reading on the 16th November, 1944, at the age of 82. He was educated at Durham College under Dr. Stroud and Prof. Weighton, and served an apprenticeship with John Dickinson and George Clark of Sunderland. With the latter he continued as Chief Draughtsman. Then followed nearly two years with Hawthorn and Leslie, and three years with Harland and Wolff at Belfast. After a short period with Wigham-Richardson and Co. in 1894, he became assistant draughtsman and then Chief Draughtsman to C. A. Parsons and Co., playing a leading part in the design of the Parsons turbine. From 1900 to 1923 he was with the Metropolitan Electric Supply Co. The first twelve years of this period saw vast changes in method: systems were changed from direct-current to alternating-current; frequencies were changed from 100 c/s to 60 c/s and then to 50 c/s; reciprocating engines were replaced by turbines. The last years of his working life were spent with A. Reyrolle and Co., from whose service he retired in 1931. It was fitting that he should have ended his career with that firm, as he had done much original work on switchgear design in Reyrolle's early days.

Bryans was first and foremost a man of high ideals which he followed through all his life and in all his work. He was also blessed with a sense of humour and a happy gift of mimicry. His stories about his work with Charles Parsons were full of humour and priceless information.

He joined The Institution as an Associate Member in 1913 and was elected a Member in 1920. J. S. H.

WILFRED BIRKS CLEEVES, who died in South Africa on the 31st December, 1943, was born on the 23rd February, 1877. He received his early education at Rotherham Grammar School and the Athenée Royal, Ghent, and his engineering education at Firth College, Sheffield Technical School and Manchester Technical School. From 1896 to 1901 he was with P. R. Jackson and Co., Salford, first as a pupil and later as an assistant to the Electrical Engineer. In February 1901 he arrived in South Africa as a sergeant in the Royal Engineer Volunteers, and, on the termination of the war, he joined the Transvaal Public Works Dept. as Assistant Electrical and Mechanical Engineer. When the Union of South Africa was inaugurated he was promoted to Assistant Chief Electrical and Mechanical Engineer, and in 1930 he became Chief Electrical and Mechanical Engineer, from which position he retired in 1932. His long career with the Public Works Department, first of the Transvaal and later of the Union, coincided with rapid and extensive growth of the activities of this Department. Originally the work consisted of relatively small installations in police stations, schools and similar buildings, but with the formation of the Union the scope expanded and he was responsible for many large and important installations. After his retirement he advised the Southern Rhodesian Government on engineering schemes, mainly in connection with hospital installations.

He was well known in the electrical circles of the Union, and although he suffered ill-health in his later years, he maintained his interest in the profession and the contact with his colleagues which had developed during a period of over 40 years. He is survived by his widow and two daughters.

He joined The Institution as a Student in 1897, and was elected an Associate in 1900 and a Member in 1931.

ARTHUR ELLIS, M.B.E., was born in 1873 and died on the 1st September, 1945. He was educated at St. Bees College, Cumberland, and the Rutherford College, Newcastle. He later became one of Sir Charles Parsons's first pupils and was actively engaged on the sea trials of the famous s.s. Turbinia. In 1892 he joined the staff of the Cambridge Electric Supply Co., and left in 1893 on his appointment as Borough Electrical Engineer at Southport. In 1896 he was appointed Borough Electrical Engineer and Tramways Manager at Bolton, a position which he held until 1900 when he was appointed to a similar position at Cardiff. In 1919 he resigned to take up private consultant practice, in which he was engaged until the time of his death. His keen and extensive knowledge of electrical distribution problems enabled him to handle many complicated and difficult cases.

He was a man of sterling character, fearless in his support of all that he considered to be fair and just, and had an outstanding personality. His sense of civic duty was always to the fore, and in 1935 he was appointed a Justice of the Peace at Cardiff. During the past six years he was untiring in his duties as a Senior Officer in the Air Raid Wardens' Organization and also as Chief Fire Guard Officer in charge of fire-watching duties for the City of Cardiff. In 1943 he was made an M.B.E. He will long be remembered by his many friends in the electrical industry, not only in the Western Centre but throughout the country.

He joined The Institution as an Associate in 1893 and was elected a Member in 1897. In 1919 he was elected Chairman of the Western Centre, and he served as an Ordinary Member of Council from 1930 to 1933. He was also an active member of The Institutions of Civil and of Mechanical Engineers. E. J.

SIR JOHN AMBROSE FLEMING, M.A., D.Sc., F.R.S., was born at Lancaster on the 29th November, 1849, and died at Sidmouth on the 18th April, 1945. As a boy he spent much of his time in the works of his grandfather, John Bazley White, a mechanical engineer who pioneered the manufacture of Portland cement in Kent. In 1863 he entered University College School, London, and in 1866 passed into the College. For financial reasons he left before graduating, and while working as a clerk he took the B.Sc. degree. After a period as science master at Rossal School, he entered the Royal College of Chemistry, South Kensington, as a student, and then went to Cheltenham College as a science master. At the age of 28 he went to Cambridge to study for two years under Clerk Maxwell in the Cavendish Laboratory. He was Professor of Physics at Nottingham University College for nearly a year, and was then offered consulting work which brought him back to London in 1882. In 1884 he was invited to the newly founded Chair of Electrical Engineering at University College, London, which he occupied for 41 years.

In 1879 both the Edison and the Bell Telephone Cos. began to install telephone systems in London, but they soon combined and Fleming became their scientific adviser. Then the Edison Electric Light Co. invited him to help them, and when, in 1883, the Edison and Swan interests combined, Fleming continued as consultant. About this time he also helped to introduce into ships the direct coupling of engine and dynamo developed by Hopkinson, to replace belt drive; but his chief contribution to technical development was probably that of the photometry of electric lamps. Later he advised a number of municipalities on the adoption of electric light, and became adviser to the London Electric Supply Corporation, which was operating the Ferranti alternating-current system. In this connection he made many tests on transformers which led to a comprehensive book on the subject.

In 1899 he was appointed adviser to the Marconi Wireless Telegraph Co., for which he designed the heavy-current plant for delivering 20 kW at high voltage to the spark circuits at Poldhu, the first station erected for transatlantic radiocommunication. Then he devised methods of measuring numerous high-frequency quantities which assisted greatly in the technical development of

a number of inventions. A special contribution to radio was his diode rectifier, which he patented in November, 1904. Among his other contributions to physical science may be mentioned his numerous papers on the magnetic and electrical properties of materials at very low temperature.

He made an immense contribution to the dissemination of electrical technology by the courses he organized at his College, by his public lectures and by his books. His lectures were triumphs of lucidity, compression and skilful demonstration.

He became a Member of The Institution in 1882 and was elected an Honorary Member in 1922. He served on the Council several times and as Vice-President from 1903 to 1905. He read a large number of papers before The Institution, for which he was awarded premiums in 1903 and 1912, and in 1923 he delivered the 14th Kelvin Lecture on "Problems in Telephony, Solved and Unsolved." In 1928 he received the 7th Faraday Medal. At various times he was also awarded the Kelvin Medal, the Hughes Medal of the Royal Society, the Albert Medal of the Royal Society of Arts, and the Duddell Medal of the Physical Society. He was knighted in 1929. W. H. E.

JOHN SOMERVILLE HIGHFIELD, a Past-President of The Institution, died on the 15th August, 1945, at the age of 73.

He received his early education at Rydal School, and his engineering education at King's College, London, where, after obtaining his diploma as an Associate in 1893, he remained for a year as a demonstrator under Dr. John Hopkinson and Professor Ernest Wilson, and was also engaged in electrical research. After brief periods of service with the Chloride Electrical Storage Co. and with Manchester Corporation Electricity Department, in 1895 he was appointed Resident Engineer at the Stafford Corporation power station, where he spent three years in installing new plant. This was followed by a similar appointment at St. Helens, Lancs., where, in 1898, he became Borough Electrical Engineer. In 1903 he was appointed Chief Engineer and Manager of the Metropolitan Electric Supply Co. During his tenure of office with that company, he introduced the Thury system of high-voltage direct-current distribution over a considerable area in West London; he originated the metal-enclosed busbar system for switchgear; conducted research on air-insulated single-core cables; discovered that the failure of high-voltage alternator windings was due to the access of air, which lead to electrical discharge, and devised a method of solid insulation to remedy the defect.

In 1917 he established his practice as a consulting engineer. Four years later he went into partnership with his brother, the late Mr. W. E. Highfield, and the firm, which in 1924 was joined by Mr. Roger Smith, acted as consultants for many important electricity supply undertakings in this country and on the Continent, including the Central England Scheme of the Central Electricity Board. During the War of 1914–18, he demonstrated the use of shrouded hydrophones for detecting submarines.

He was well known as an expert witness in actions at law and arbitrations. He also gave evidence before parliamentary committees in connection with electricity supply powers.

He was Chairman of the Fuller's Earth Union, and a director of the London Power Co., London Associated Electricity Undertakings and Central London Electricity, and he served on the Council of the Incorporated Association of Electric Power Companies. He was a Member of The Institution of Civil Engineers and of the Société des Ingénieurs Civils de France, and a Fellow of the American Institute of Electrical Engineers. He was a Past-President of the Junior Institution of Engineers and of the Association of Supervising Electrical Engineers; a Vice-President of the Royal Institution and of the Royal Society of Arts; and Vice-Commodore of the Royal Thames Yacht Club.

He became a Member of The Institution in 1900, and was elected an Honorary Member in 1945 in appreciation of his distinguished work in the development of the science of the supply and application of electricity. During this period he served once on the Manchester Local Committee, twice on the Benevolent Fund Committee, three times as an Ordinary Member of the Council, twice as a Vice-President; in 1921 he was elected President, and during his term of office he presented personally the first Faraday Medal to Oliver Heaviside. In 1901 he was awarded a premium for his paper on "Storage Batteries in Electric Power Stations, controlled by Reversible Boosters." His three papers on "The Transmission of Electrical Energy by Direct Current on the Series System" were published in the *Journal* in 1907, 1912 and 1913. His papers on "Suggestions for a Trade Court" and "A Suggested Remedy in Unemployment Insurance" were published elsewhere.

We mourn a great pioneer in electrical engineering, a great character and a lovable man. He possessed that rare gift—engineering instinct—and his imagination, coupled with a natural gift for practical application, enabled him to find solutions for a great many engineering problems. He combined an innate appreciation of scientific facts with an almost instinctive capacity to translate them into practical use. An artist in his work, he loved it, and he loved to give and to create—therein he found his reward. He was a great individualist. All things human were near to his heart. He loved his fellow men but mistrusted untried doctrines and generalities. He disliked uniformity and the mass mind, and believed, above all, in individual self-expression, in independence and liberal thought. He stressed the necessity of developing both mind and body. A man of action, he believed in doing things rather than in talking about them; he rated craftsmanship as high as science. He always sought for the best and loved quality in all endeavour. He had a great understanding of poetry, art, and music, and was no mean performer on the piano and the violin.

His deep love for the sea played a prominent part in his life. It brought him close to the elements and taught him basic eternal principles—serenity of mind, the importance of self-reliance and of quick decisions, the courage to dare, and the judgment how far to dare. For his friends he was ever a fount alike of wisdom, of restfulness and of never failing help. He scintillated humour and the sparkle of life. He leaves us the poorer for his going, the richer for having known him. That applies to all of us, his brother engineers, his fellow yachtsmen, his mechanics, his skipper, his gardener. A fellow-artist mariner once said, "A man's life is that accorded to him in the thoughts of other men by reason of respect or natural love." Jack Highfield's ship has drawn ahead, but his real life goes on; for deep within us will always abide love and respect for a fine and fearless friend.

H. R.

ALEXANDER GEORGE IONIDES, B.A., who died on the 1st February, 1945, was born on the 8th April, 1870, and was educated at Harrow and Clare College, Cambridge, where he acquired the scientific and mathematical complement to his innate ability as a designer and research worker. He received his practical training as a student apprentice at the Brush Co's. works at Loughborough. His love of tackling difficult problems brought him in contact with many branches of engineering, particularly in the early days of the motor-car and radio. He was at one time Consulting Engineer to Vauxhall Motors, and for many years he did research work for Rolls-Royce. His Polyrhoe carburettor was one of the first scientific attempts to meet the many variable requirements of a motor-car engine, and his Screwdraulic jack became part of the standard equipment of many manufacturers. During the War of 1914–18 he held a commis-

sion in the R.N.V.R. and was engaged in the Admiralty Experimental Dept., where he did research work on mines and hydrophones and developed a submarine detector which was used during the closing phases of the war. He returned to this Department for a year during the Second World War.

He was a good mixer, and his genial spirit, his sense of humour and his altruism brought him many friends and admirers in whose difficulties he always took a keen interest, so that indirectly he was responsible for much development work in addition to his own. He was the type of man the country can ill afford to lose, and many will sympathize with his wife, son and daughter, who also mourn the loss of the eldest son, killed in action during the invasion of Normandy.

He became a Member of The Institution in 1903. He was also a Fellow of the Institute of Physics, a Member of the Faraday Society, and a Member of the Institution of Automobile Engineers.

DR. **MAX LUDWIG KAHN,** who died suddenly on the 26th July, 1945, was born in Mannheim in 1877 and received his training at the Technical High School, Karlsruhe, under Prof. E. Arnold, where he was awarded the degree of Doctor of Engineering for original work on the contact resistance of carbon brushes. As a result of this success, he was invited to collaborate with Prof. Arnold and Dr. la Cour in the preparation of a series of textbooks, comprising seven volumes dealing with the design and construction of electrical machinery, which are now generally regarded as classics.

He came to this country in 1904 as Chief Designer of the Brush Electrical Engineering Co., and adopted British nationality. After nine years at Loughborough, he joined the General Electric Co. at Witton in a similar capacity, becoming Chief Engineer in 1933. For over 40 years he was thus closely associated with the great developments that have taken place during this period of rapid advance. He was particularly interested in the design of large alternators, rotary convertors, and motors for rolling-mill drive, colliery winding, ship propulsion, and all kinds of traction. Special mention may be made of the first of these, as he was responsible for the design of some of the largest turbo-generators to be manufactured in this country.

He was a familiar figure at Institution meetings, and his contributions to the discussions were always thoughtful and constructive. He was a great admirer of the British people and their institutions, and his friends came to rely on him as a shrewd commentator on international affairs. His loss will be keenly felt by his many colleagues, not only in his own firm, but throughout the electrical industry, as he was a man of a most friendly disposition, always seeking to do acts of kindness, and a good mixer with equals and subordinates alike. Of simple tastes, he spent much of his spare time cultivating the beautiful garden he had laid out at Westmead, his home in Sutton Coldfield. Mrs. Kahn and their two daughters survive him.

He became a Member of The Institution in 1911, and served on the Birmingham Local Section Committee from 1912 to 1914. W. W.

CECIL WILLIAM KENNAWAY, who died on the 6th December, 1944, at the age of 71, was educated at Christ's College, Christchurch, New Zealand, and at King's College, London. He spent some time as a sea-going Engineer in the Merchant Service, and in 1899 joined the staff of Preece and Cardew (now Preece, Cardew and Rider). After serving for a few years in the drawing office and assisting in the preparation of specifications and designs for the various works then in hand, he was selected in 1901 to be the firm's Resident Engineer for the installation of the electrical supply undertaking at Whitby. Afterwards he was appointed to the post of Borough Electrical Engineer, but in 1903 he returned to Preece and Cardew, who were then engaged on the electrification of H.M. Dockyards both at home and abroad, and he was from then onwards actively engaged in the laying out of electrical installations at the Gibraltar and Malta Dockyards. Work for overseas installations had a particular interest for him, and he supervised for many years much of the firm's activities in this direction. He was made a partner in the firm of Preece, Cardew and Rider in 1924, retiring in 1940. Unfortunately, his later days were marked by tragedy occasioned by the war, an enemy bomb in 1944 demolishing his home, killing his wife and causing him severe injuries from which he never fully recovered. Rather reserved in manner, and somewhat retiring in his disposition, he possessed a charm which endeared him to those who came in contact with him. Possessed of a good memory and being of very methodical habits, he was intolerant of anything slipshod and nothing but the best satisfied him.

He joined The Institution as an Associate Member in 1901 and was elected a Member in 1907. A. P.

HENRY KITCHEN, who died on the 6th April, 1945, at the age of 70, was one of the rapidly diminishing number of engineers who entered the service of the Post Office when the Wheatstone ABC, the single-needle, the morse sounder and the Wheatstone transmitter and receiver were the standard telegraph instruments in this country. Before he retired in 1935 he had seen the last of them give place to the teleprinter and the telephone. He received his early education at the Wesleyan School, West Hartlepool, and his engineering education at Rutherford Technical College and Armstrong College. Commencing his career as a telegraphist at Newcastle-on-Tyne in 1889, he was transferred to the Engineering Dept. as a repeater clerk at East Dean and, later, at Haverfordwest, and returned to Newcastle as a Sectional Engineer in 1902. In 1926 he was transferred to London as an Assistant Staff Engineer in the Engineer-in-Chief's Office, and in 1931 he became Superintending Engineer of the Scotland East District.

The year 1889 was marked by the installation at Newcastle of A. W. Heaviside's telephone multiple switchboard. Thus Kitchen was, at the outset of his career, brought into close contact with telephone development, and throughout his service he was actively engaged in that development in the provinces. From 1912 to 1914 he was engaged as a Lecturer in Telegraphy and Magnetism at Rutherford College and for the County of Durham Education Committee.

He was interested in music and possessed a rich tenor voice which would have carried him far had he chosen singing as a profession. His disposition was genial, his tastes were simple, and he was a true and staunch friend.

He joined The Institution as an Associate Member in 1910 and was elected a Member in 1921. He served on the Committee of the North-Eastern Centre from 1919 to 1922. C. W.

LUCIEN ALEXANDER LEWIS, who died on the 20th January, 1945, at the age of 62, received his early education at Brighton Grammar School and his engineering education at Finsbury Technical College. After serving an apprenticeship with Crompton and Co. he was retained on the staff of that company, at first in the Instrument Dept. and subsequently in the Sales Dept. In 1905 he obtained an appointment as Estimating Engineer with the Lancashire Dynamo and Motor Co., and the following year he was selected for the post of Assistant Inspector of Scientific Supplies in the India Store Department, where he spent the rest of his working life. He was appointed Electrical Engineer to the Department in 1917, Deputy Director of Inspection in 1936, and Director of Inspection in 1939, thus becoming the head of the technical side of the Department.

Throughout his long service under the Government of India, he was conspicuous for his breadth of technical knowledge and for his unremitting devotion to the duties entrusted to him. He will long be affectionately remembered by his many friends and colleagues.

He joined The Institution as a Student in 1902 and was elected an Associate Member in 1907 and a Member in 1920. In 1904 he was awarded a Student's Premium for a paper on "Notes on Commercial and Experimental Testing of Continuous-Current Machinery." J. P. F.

CHARLES HAWTHORNE LYDALL was born in Kensington in October, 1878. He died in his 67th year at Baltimore, U.S.A., on the 25th April, 1945. He was educated at Kings College, London, and served an apprenticeship with Messrs. Simpson at their Grosvenor Road works, London.

Lydall had a professional career of unusual variety and interest in connection with electricity supply and electric traction. This so developed that he held in turn appointments, most of them of long duration, in all five Continents. Few who were in the first instance practical engineers, engaged primarily in constructive engineering, can have had such world-wide experience. In his long sojourns abroad, he met people of all kinds in every walk of life, and it was no accident that he was so often requested to undertake pioneer work, more especially in electric traction. Combined with a wide knowledge of engineering detail, he had a most attractive personality, and he quickly gained the confidence and friendship of those with whom he became associated. He possessed, in fact, most of the qualities of a successful diplomat or ambassador, so that he was in every way a worthy representative overseas of Great Britain and of the "English way of life."

Having completed his apprenticeship, he joined the City and South London Railway. In 1905, after a brief period in the power station at Dover, he joined the County of Durham Electric Power Co., with which company he remained until 1911, being latterly Manager of the Bishop Auckland area. In 1911 he began a close association with Merz and McLellan, the consulting engineers of the company, which lasted for the rest of his life. Under their advice, first the Central Argentine Railway, and later the Buenos Aires Western Railway, had decided to electrify their suburban lines, and Lydall was appointed Merz and McLellan's representative in Buenos Aires, where he remained until 1920. It was there that he first developed his resource in discussion and success in conference, for he had a number of delicate negotiations to conduct with the Argentine Government on behalf of the railway companies. Having completed the Argentine work, Lydall was called upon at once to undertake similar and growing responsibilities further afield: in Australia (1921–22), South Africa (1922–28) and India (1928–29). At the end of 1929 he became Merz and McLellan's representative in America, and during the following years had much to do with negotiating arrangements for load distribution between the numerous associated undertakings in and about the city of Chicago. During the Second World War he had devoted most of his time to work for the South African War Supplies Commission in the United States, first in New York and latterly in Washington. Unfortunately he did not live to see the end of the war, which would have enabled him to renew, after a long interval, his many friendships in this country.

He joined The Institution as an Associate Member in 1908 and was elected a Member in 1928. R. N.

CHARLES EDWARD MASON was born at Malmesbury on the 19th February, 1879, and died in Johannesburg on the 4th March, 1944, survived by two daughters. After serving an apprenticeship with a firm of mechanical engineers in London, he went to South Africa at the time of the Boer War.

In 1905 he joined the staff of the Rand Water Board as Electrical Engineer, and in 1908 was appointed Superintendent of the Board's pumping station at Zwartkopjes. In 1912 he was appointed Chief Mechanical and Electrical Assistant, in which capacity he was responsible to the Chief Engineer, the late W. Ingham, M.Inst.C.E., M.I.Mech.E., for the electrical and mechanical plant installed for the original Vaal River Scheme, designed at that time for the supply of 20 million gallons per day to the Witwatersrand. This scheme consisted of a barrage across the Vaal River, an intake station and main pumping station and the necessary purification works at Vereeniging, additional pumping plant at Zwartkopjes pumping station, and interconnecting pipelines between Vereeniging, Zwartkopjes and the Witwatersrand. During the War of 1914–18 he held commissioned rank in a Water Supply Company in East Africa, and later saw service with the Royal Engineers in France. In 1924 he was appointed Chief Engineer to the Board, but was obliged to retire in 1931 owing to ill-health. During his period of service, the average daily consumption from the Board's water supply undertaking increased from 2·3 million gallons to 17 million gallons.

He joined The Institution as a Member in 1919. He was a Past-President of the South African Institution of Engineers. J. P. L.

ALBERT EDWIN MOORE, M.Sc.Tech., who died on the 5th December, 1944, at the age of 67, was educated at Mason's College and the Technical School, Birmingham. In 1900 he was appointed Lecturer and Demonstrator in Electrical Engineering at the Manchester College of Technology (then the Municipal School), where he spent the whole of his working life. When he retired, in August, 1944, he was Senior Lecturer in Meter Engineering and Electrical Measurements to the College of Technology and the University.

From 1902, when the College moved to its present site, he devoted most of his attention to the building up of the instrument and measurement section of the Electrical Department. At first, much of his time was taken up with the care and maintenance of the normal laboratory equipment. Later he developed the precision measurement side of the work, specializing in the checking of commercial energy meters where the opinion of an independent referee was required; in this he gained for the College a well-earned reputation in local industry. He designed and developed the concentric wattmeter for heavy alternating currents; owing to the introduction of the modern magnetic alloys, however, the need for such an instrument became less urgent. In his earlier days he played an active part in the general teaching work of the College, though with the increasing specialization in the various branches of electrical engineering he naturally confined himself more to his own particular subject, on which he read several papers before The Institution, for two of which he was awarded premiums. In later years the passing of the various Electricity Supply Acts brought extensions of his activities over wider fields, but he always maintained the reputation for high accuracy that was characteristic of his work.

During the War of 1914–18 he was a member of the Lancashire Anti-Submarine Committee, for the work of which his experience of accurate measurement particularly suited him. For ten years he was retained as a consultant by Kelvin, Bottomley and Baird. After his retirement he continued to take an interest in all the activities of the College, and the unexpected news of his death was a great shock to those who had known and worked with him.

He joined The Institution as an Associate Member in 1903 and was elected a Member in 1918. From 1932 to 1939 he served on the Committee of the North-Western Centre. J. H.

DONALD MURRAY, M.A., was born at Invercargill, New Zealand, in 1866, and died at Territet, Switzerland, on the 14th July, 1945. After leaving the University at Sydney, he took up journalism, for he had a facile pen. He was also a born mechanic, so that the mechanical features of a newspaper office attracted him, and ideas of setting type by telegraph began to germinate in his mind. In 1898, when these ideas had taken a practical form, he went to New York, where he joined the staff of the Postal Cable Co. Two years later he came to London and for a short time worked at the General Post office on the development of his first system of printing telegraphy. This system was fully described in his paper on "Setting Type by Telegraph," which was published in the *Journal* in 1905 and for which he was awarded the Fahie Premium. The paper marked an era in the presentation of papers on telegraphy; among other things it laid down the fundamentals required of a successful printing telegraph system with respect to the form of alphabet or code to be employed.

He then designed a system of multiple telegraphy which possessed important advantages over that of Baudot: his phonic-wheel motor, in combination with Baudot's epicyclic correcting train, gave such excellent synchronism that it was adopted by the French Telegraph Administration. This system was described in a second paper, entitled "Practical Aspects of Printing Telegraphy," which was published in the *Journal* in 1911 and for which he was again awarded the Fahie Premium. In 1914–15 he contributed a series of articles to the *Telegraph and Telephone Journal*, entitled "Press the Button Telegraphy," and in 1925 he was awarded the Paris Exhibition Premium for his Institution paper on "Speeding up the Telegraphs: a Forecast of the New Telegraphy."

Murray sold his American rights in his multiplex system, but he retained its manufacture and sale in Europe in his own hands until his retirement. As an employer he was stern but just. Nothing but the best work was good enough for him, and he gathered around him a group of craftsmen who were unrivalled.

In his later life abroad he engaged in literary work. Two of his books, "The Philosophy of Power" and "The Theory of Control" have been published. A third book, "Speeding up the Railways" is unfinished; he was half-way through this, in 1940, when brain trouble set in. He underwent three operations at Monte Carlo, after which he and Mrs. Murray moved into Switzerland; but he was too ill to take up his work again and lingered on in a state of invalidism, never fully recovering.

He became a Member of The Institution in 1910. In the field of machine telegraphy his name deserves to rank with those of Wheatstone, Kelvin, Baudot and Gulstad. H. H. H.

COLONEL GUY DURAND OZANNE, M.C., who died on the 12th February, 1944, at the age of 54, was the elder son of Lieut. Col. C. H. Ozanne and Louisa Durand Kershaw. He was educated at King's School, Rochester, and, like his father before him, at Elizabeth College in Guernsey, the homeland of the Ozannes and the Durands. Passing out of Sandhurst in 1909, he was attached to the 2nd Royal Berkshire Regt. until he joined the 99th Deccan Infantry, Indian Army, in 1912. During the War of 1914–18 he served in East Africa as Regimental, Brigade and, finally, Divisional Signals Officer, having been promoted to field rank in 1917. He was in action at Tanga and Bushoba and, besides being mentioned twice in despatches, was awarded the M.C. He retired from the Indian Army in 1923.

On returning to England, Ozanne became interested in radio manufacture, and was Manager of the Radio Communication Co. from 1924 to 1926, when he joined Wingrove and Rogers. Notwithstanding his busy life in industrial affairs, he always found time and energy to devote to the London Territorials: from 1930 to 1935 he was Officer Commanding the City of London Signals, and later was Deputy Chief Signal Officer. From 1940 until the time of his death, he was engaged on special military duties.

During the last two years of his life he served on the Council of the Guernsey Society in London, and played an active part in the efforts of that Society to alleviate the misery of the Islanders under the German occupation. He had also served as Chairman of the Electric Vehicle Association and of the Radio Component Manufacturers' Association. He was deservedly popular with all his professional colleagues: it was an outstanding trait of his character that he never discussed his associates unless his comments were favourable, courteous and kindly. He lived a full and many-sided life as soldier, electrical engineer and man of affairs. He is survived by his widow.

He joined The Institution as an Associate Member in 1923 and was elected a Member in 1928; he served as a member of the Wireless Section Committee from 1938 to 1941. E. B. M.

ROMUALD VICTOR PICOU, a former President of the Société Française des Électriciens, died in Paris on the 21st September, 1942. He was born at Saint-Denis (Seine) on the 24th July, 1855, and was educated at the lycées Louis-le-Grand and Saint-Louis. He became a student at the École Centrale des Arts et Manufactures in 1873 and, on the termination of his studies in 1877, was awarded an engineering diploma. In the same year he illuminated a small workshop by means of a Serrin arc-lamp mounted on rails fixed to the ceiling, and operated by a Gramme dynamo; the prime mover was a Brotherhood three-cylinder steam-engine. The successful operation of this plant led to similar installations, and from these small beginnings were laid the foundation of Picou's career as an electrical engineer. The Paris Electrical Exhibition of 1881 gave the young enthusiast his opportunity, for he was invited by a group of French financiers to report on the first Edison lamps and system of generation and distribution, which were there exhibited. His favourable report led to the formation of the French Edison Company in January 1882, and he was engaged to supervise the erection at Ivry of a factory for the manufacture of electric lamps and plant. A few months later he was sent to the United States, where he met Edison and gained experience in central station construction and in Edison's laboratory at Menlo Park. On his return to France in 1883 he became Director of the factory at Ivry and was responsible for the equipment of the generating station at the Avenue Trudaine, Paris.

In 1890, in private practice, he undertook the design and construction of a number of generating stations for various organizations, and he was responsible for the first power supplies at Soissons, Epernay, Saint-Quentin, Elbeuf, Trouville, Algiers, Oran, Alexandria, Cadiz, etc. He also acted as consultant to the Société Lebon and other electrical manufacturing concerns and undertakings, and in 1893 was closely associated with the setting up of the Bureau de Controle des Installations Électriques, of which he was appointed Director. He was appointed Engineer-in-Chief of Electrical Services at the Paris Exhibitions of 1889 and 1900.

He was the author of several textbooks and many articles on dynamo-electric machines, distribution of electricity, magnets and cognate subjects. For ten years he lectured at the École Nationale des Ponts et Chausées. At the end of a long and active life Picou had gained the reputation of a genial scientist, ever ready to help or to collaborate with his colleagues.

He was a Foundation Member of the Société Française des Électriciens (then known as the Société Internationale des Électriciens), and became its President in 1898; subsequently he was elected President of Honour. He joined the Société des

Ingenieurs Civils de France in 1891 and served on the Council from 1893 to 1895, becoming Chairman of the Electrical Industries Section in 1909. He was also President of the Comité Électrotechnique Français. His extensive technical activities brought him the following honours: Officer of the Legion of Honour, François Coignet Prize of the Société des Ingenieurs Civils de France; Gaston Planté Prize of the Académie des Sciences; Mascart Medal of the Société Française des Électriciens.

He became a Foreign Member of The Institution in 1888, and a Member in 1911. From 1911 to 1921 he served as Local Honorary Secretary of The Institution for France. H. L. D.

WILLIAM ERNEST POOLE, who died on the 6th April, 1945, was born in Lancaster on 9th April, 1882. He was educated at Lancaster Grammar School and at the Harris Institute, Preston, his professional training and early experience being gained with the Newcastle Electric Supply Company and at Armstrong College (now King's College), Newcastle-on-Tyne. From 1903 to 1905 he was engaged on the electrification of the North Eastern Railway, Tynemouth Branches, and later he became Resident Engineer and Manager of the Hexham Electric Supply Company. In 1908 he joined the Tudor Accumulator Company, which engagement continued until 1916, when he became Chief Electrical Engineer to the National Amatol Filling Factory, near Leeds, where he remained until the end of the War of 1914–18. After a short period with Bristol Corporation, he joined Siemens Brothers in 1919 and remained in the service of that company until his death. His activities for Siemens were almost entirely concerned with the design and erection of overhead transmission lines, a subject on which he became an expert. He erected many important lines in this country and also in India and Ceylon.

In addition to his professional activities he took a keen interest in all branches of human endeavour, especially in the practice and encouragement of craftsmanship, with full appreciation of its artistic aspects. One of his principal hobbies was numismatics, and he was a member of the Council of the Royal Numismatic Society. In all that he did he exhibited a marked capacity for leadership and a characteristic flair for thoroughness.

He joined The Institution as an Associate Member in 1909 and was elected a Member in 1926. M. C. T.

BARON **CHARLES WALCKENAER** was born at Lisieux (Calvados) on the 7th November, 1858. During a brilliant college career he followed a family tradition by showing natural aptitude both for belles-lettres and science He gained second place at the École Polytechnique in 1877, and first place on passing out to the Corps des Mines; it was in this famous corps of State engineers that his entire administrative career was developed.

Having gained experience at Pau and subsequently at Châlon-sur-Saône he returned to Paris in 1885, and from that time he was connected particularly with technical and administrative questions regarding steam plant, utilization of fuel and, subsequently, road transport.

For more than 50 years he served on the Commission Centrale des Machines à Vapeur, of which he became the President, and he played a leading role in the drawing-up and periodical revision of the regulations governing this type of plant.

In 1898 he took charge of the special course on steam engines at the École Nationale des Ponts et Chausées, a post which he held until 1925. He was a member of the jury at the Paris Exhibition of 1900, and he also took part in the organization of several other exhibitions and international congresses. In addition, he was closely connected with technical and administrative problems which arose on the introduction of the motor-car in France; in this connection he was elected President of the Commission Centrale des Automobiles and represented France on similar bodies. The high and impartial position he held permitted him to play a very important part as arbitrator and consultant in industrial circles. Between 1920 and 1939 he organized a number of congresses which dealt with questions of industrial heating, and their success and the strong impetus they gave to the industry were largely due to him. At the same time he collaborated with a number of other associations, among which may be mentioned the Société d'Encouragement pour l'Industrie Nationale. In 1925 he became Vice-President of the Conseil Général des Mines.

His charming manners, coupled with great clarity of thought and expression, lent distinction to any function at which he presided or attended. By these attributes and his high sense of moral obligation and devotion to duty, his work in administrative spheres is still regarded as exemplary.

In latter years and when the German occupation forced him to live in retirement at Quincey (Aube), he devoted his time to the administration of his small commune. His private life was marked by great tribulations. Following the premature loss of his wife, his home life was devoted to the education of his seven children. One son fell in the early days of the War of 1914–18; another died as a prisoner in Germany in 1941; four of his grandchildren were killed in action during the Second World War. These final misfortunes broke down the indomitable courage of Charles Walckenaer, and he died in Paris on the 1st January, 1941, following a brief illness.

He was a Commander of the Legion of Honour, and held numerous French and foreign decorations.

He became a Foreign Member of The Institution in 1893 and a Member in 1911. M. R.

WILLIAM WYLD, who died on the 18th April, 1945, at the age of 72, was apprenticed with Lingford, Gardner and Co., Bishop Auckland, and received his technical education at the Lightfoot Institute, Bishop Auckland, at Firth College, Sheffield, and at Sheffield Technical School. In 1895 he was appointed technical assistant to the Borough Electrical Engineer at Blackpool, where he later became a charge engineer, and in 1897 he became Chief Assistant Electrical Engineer to the Salford Electricity Dept. In 1899 he was appointed Chief Electrical Engineer to the Patent Shaft and Axletree Co., Wednesbury, where he designed and erected a power station and installed electric light, together with electric power to replace the existing steam- and gas-engine drives. As a result of his experience with this plant, which was one of the earliest three-phase installations in the country, he read a paper on "Polyphase Equipment of Factories" before the Birmingham Local Section in 1901, for which he was awarded a premium. In the same year he went to Doncaster as Borough Electrical Engineer; here he extended the power station and was responsible for laying 12 miles of tramways, after which he became Tramways Manager as well as Borough Electrical Engineer. From 1904 to 1913 he was General Manager of the Birkenhead Corporation Tramways, and for the last six years of that period he combined his duties with those of Borough Electrical Engineer. From 1913 to 1921 he was Chief Electrical Engineer and Manager to the Borough of Hampstead. In 1921 he joined the Spearing Boiler Co. as Sales Engineer, and was retained when that company was taken over by the Vickers Boiler Co. He was subsequently employed by Babcock and Wilcox as Sales Engineer until his retirement in 1932.

He joined The Institution as an Associate in 1896 and was elected an Associate Member in 1901 and a Member in 1904. He served on the Birmingham Local Section Committee in 1901. He was also a Member of The Institution of Mechanical Engineers.